

Stormwater Management Program

Operations & Maintenance

Prepared for:
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Effectiveness Literature Review





Ranked Topics and Questions: Topic #5

Null Hypothesis: Frequency of inspecting and cleaning catch basins is not dependent on land use or road size.

- > Do catch basins on arterial streets require more frequent cleaning vs. non-arterial streets?
- > Can land use or road size/type be used to set an optimal frequency vs. non-arterial streets?
- > Does the land use surrounding a catch basin influence the rate of sediment accumulation in catch basins?
- > Can catch basin maintenance frequency be determined by land use surrounding the catch basin?



Ranked Topics and Questions: Topic #15

Null Hypothesis: Catch basins do not contribute sufficient fecal coliform bacteria to exceed water quality standards.

- > Are catch basins a significant source of fecal coliform and other pollutants?
- > What frequency of catch basin maintenance is needed to reduce the level of fecal coliform to meet TMDL requirements?

Background

- > In Washington it is estimated that 1/3 of all polluted waters are the result of unmanaged stormwater.
- > 18 WRIAs in W. Washington have TMDL designations for fecal coliform.
- > Catch basins can reduce sediment and sediment bound pollutants from entering downstream water bodies.
- > Routine maintenance and cleaning of catch basins is critical to their sediment removal performance.
- > Catch basins may also be a source of fecal coliform and other pollutants if not maintained or cleaned regularly.
- > WA State water quality standards for fecal coliform range from a geometric mean of 50 colonies/100 mL for Extraordinary Primary Contact Recreation water bodies to 200 colonies/100 mL for Secondary Contact Recreation water bodies.



Do catch basins on arterial streets require more frequent cleaning vs. non-arterial streets?

- > Articles did not specifically look at arterial versus non-arterial streets.
- > One study found that heavily traveled commercial streets accumulated sediments at a rate 2-3 faster than high density residential streets.

Literature indicates more heavily traveled roads = faster sediment accumulation rates. May be more appropriate to look at AADT rather than arterial vs. non-arterial.



Can land use or road size/type be used to set an optimal frequency for inspection and cleaning catch basins?

- > Both land use and road type affect sediment accumulations rates.
- > Other factors that affect sediment accumulation include: weather, topography, particle size, & erodability of soils.
- > Size of catch basin sump has a large effect on frequency of cleaning.

With this many factors affecting sediment accumulation, it seems that optimal frequency for inspecting/cleaning catch basins can not be determined based on land use or road size alone.



Does the land use surrounding a catch basin influence the rate of sediment accumulation in catch basins?

- > Studies indicate surrounding land use does influence sediment accumulation rates.
- > In general, sediment accumulation rates in industrial areas > commercial areas > residential areas.
- > Commercial/industrial areas were shown to have sediment accumulation rates 4x greater than residential areas.


Surrounding land use is one factor influencing rate of sediment accumulation in catch basins. Different land uses can result in significantly different sediment accumulation rates.



Can catch basin maintenance frequency be determined by land use surrounding the catch basin?

- > Surrounding land use is one factor that affects sediment accumulation rates, and therefore the required maintenance frequency.
- > Other factors include size of the catch basin sump, weather, topography, particle size, & erodability of soils.

Surrounding land use can be a factor in determining catch basin maintenance frequency. However many other factors are involved and it does not seem that maintenance frequency can be determined solely by the surrounding land use.



Are catch basins a significant source of fecal coliform or other pollutants?

- > High levels of bacteria have been detected in waterways, particularly near storm drain outlets or shoreline outfalls.
- > Bacteria may bind to and survive longer in sediments than in the water column, therefore sediment that settle out in catch basins could become a significant source of bacteria if the sediment is remobilized or transported.
- > Conditions within catch basins provide ideal setting for the growth of biofilm and regrowth and replication of bacteria.

Catch basins can be a source of fecal coliform – both from the transport of sediment bound bacteria or replication and regrowth of bacteria on biofilm. Based on the available literature it is not clear if they have the potential to contribute sufficient levels to exceed water quality standards in downstream water bodies.



What frequency of catch basin maintenance is needed to reduce the level of fecal coliform to meet TMDL requirements?

- > To reduce effects of sediment bound bacteria catch basins should be maintained and cleaned regularly.
- > Maintaining catch basins to address the growth of biofilm and replication of bacteria may be more difficult. The level of action to remove biofilm would likely be more than most municipalities could support.

How frequently catch basins should be maintained to reduce levels of fecal coliform to meet TMDL requirements will vary by watershed and by catch basin.



Recommended Effectiveness Studies & Further Lit Search

1. Perform survey to evaluate current catch basin cleaning frequency relative to SWMM for Western Washington.
2. Map catch basins by size and land use. Monitor the catch basins to calculate sediment accumulation rates.
3. Conduct studies to assess the effectiveness of various BMP types at removing bacteria and fecal coliform.
4. Conduct studies in Western Washington to look at the presence of biofilm in local catch basins and their influence on downstream bacteria levels.
5. Assess how activities – cleaning biofilm material, street sweeping, using storm drain filters – reduce growth of biofilm and fecal coliform.
6. Assess feasibility and cost effectiveness of retrofitting catch basins requiring frequent cleaning to include a larger sump.